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PAINT MANUFACTURING HAZARDOUS WASTE
LISTING DETERMINATION SUPPORT

U.S. Environmental Protection Agency
Office of Solid Waste

December 30, 2001

SAMPLING POPULATION DETERMINATION
FINAL REPORT

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LIST OF ACRONYMS

ABL	American Business List
D&B	Dun & Bradstreet
OEM	Original Equipment Manufacturer
QRT	Quick Response Task
RCRA	Resource Conservation and Recovery Act
SIC	Standard Industrial Classification
TRI	Toxic Release Inventory
WAM	Work Assignment Manager

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1. OVERVIEW

On November 30, 1999, EPA issued a Quick Response Task (QRT) that directed its contractor, Dynamac Corporation, to develop a statistical sampling methodology for the distribution of the RCRA Section 3007 Questionnaire for Paint Manufacturing Facilities (questionnaire). In order to reduce the burden on industry and in light of Agency time and resource constraints, the Agency decided to use a statistical sampling approach rather than a census survey. A previous work assignment had estimated the number of paint manufacturing facilities in the U.S. at approximately 1,000 to 1,200. The Agency believed that a statistical sampling would still produce an accurate representation of the industry. Dynamac was requested to demonstrate statistically that this belief was correct, and identify a suitable sampling approach. The deadline specified in the QRT for the draft methodology was December 9, 1999. On that date, Dynamac submitted the draft report to the EPA Work Assignment Manager (WAM) that described several applicable statistical sampling methods, including the one eventually selected by EPA. Following the submittal of the draft report, EPA and Dynamac (represented by the WAM and statistician) held a conference call to discuss the proposed sampling methods and answer EPA's questions. The final report, QRT #3 Final Report, which incorporated EPA's comments on the draft, was submitted by Dynamac on December 20, 1999. That report, as revised December 20, 2000 and included in the docket (see the Listing Background Document for the Paint Manufacturing Waste Listing Determination) for this rulemaking, contains all of the statistical analyses and calculations referred to in this report that were performed for the first round of questionnaires. Relevant portions of the QRT #3 Final Report have been incorporated herein.

The proposed sampling methods met the base requirement formulated by EPA that a one in twenty (1 in 20) event (i.e., a rare type of waste management practice) would be identified with a 90% or greater probability. EPA directed Dynamac to use the Dun & Bradstreet (D&B) database (approving the recommendation made by Dynamac in the December 20, 1999 report) to categorize the paint manufacturing industry as described later in this document. The categorization of facilities was based on the following three criteria: Standard Industrial Classification (SIC) code; dollar sales volume; and Toxic Release Inventory (TRI) generator status. The information for the first two categorization criteria were identified from the D&B database. Data for the third categorization criterion was obtained from the EPA TRI database entries listed under SIC 2851 (Paint & Allied Products). Random and unequal sampling of each category was performed to ensure that each category satisfied the requirement that a rare, 1 in 20, type of waste management practice would be identified with a 90% or greater probability. As a result of this sampling approach, the total number of samples, or questionnaires, sent to the paint industry was 299 (consisting of 250 questionnaires sent in the first mailing and 49 in the second mailing).

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2. DATA SOURCE SELECTION

The statistical analysis required the identification and purchase of a database with information on U.S. paint manufacturing facilities. The database selected was a sort of the D&B database that included all manufacturing facilities listed under SIC 2851, Paint and Allied Products. This sort could provide key information such as facility name and address, contact name and telephone number, sales volume, number of personnel, and type of paint or paint related products manufactured on-site. The D&B database is updated daily and is completely revised every 18 months or so. Other databases had been considered and rejected.

The Paint Red Book publication identifies approximately 1,200 manufacturers in both Canada and the United States. An electronic version of the Red Book list could not be provided to Dynamac in the time available and, as a result, that source was removed from further consideration.

The American Business List (ABL) contains approximately 2,800 entries under SIC 2851. However, the D&B database categories used to identify the types of manufacturers under the paint and coating SIC code more closely matched the categories to be used for the work at hand, and so the ABL database was removed from consideration.

D&B identifies each entry with an eight-digit code. The first four digits correspond to the first four digits of the SIC code, in this case, 2851. The next two digits characterize facilities by broad types of products manufactured, as shown in **Table 1**. The last two digits provide further facility information. In the case of paint manufacturers (i.e., 2851 01 xx and 2851 02 xx), the last two digits identify the type of paint or coating produced. These codes are further defined in Section 3.2.

Table 1: Dun & Bradstreet Identification System

Identification Number	Description
2851 00 00	Paint, varnishes, lacquers, enamels and allied products
2851 01 xx	Paint and paint additives
2851 02 xx	Lacquers, varnishes, enamels and other coatings
2851 03 xx	Putty, wood fillers and sealers
2851 04 xx	Paint removers and cleaners

D&B relies on facilities to provide most of the information included in its database. As a result, Dynamac and EPA were aware that the D&B database may present data quality problems such as data gaps, duplicate information, or erroneous data.

In July 1999, under a previous Paint Listing Determination work assignment, Dynamac had purchased the July sort from D&B that listed facilities under SIC 2851. The July sort included,

among other fields, facility names, addresses and SIC codes, contact names and phone numbers but not sales information. **Attachment 1** provides a list of all fields in the July sort. Since Dynamac needed sales data for facility categorization purposes, another D&B database was purchased in December 1999 (December sort). The December sort included the same information in the July sort, with the addition of sales volume and employee information and other miscellaneous fields. Each facility listed in the December sort had sales volume information. Because of the short time available (as described earlier, the QRT was issued on November 30, 1999 and a draft report was due on December 9, 1999), Dynamac suggested, and EPA approved, to use the existing July sort as the prime source of information. The expectation was that little change to the main body of common data included in the July and December sorts had occurred over the five-month interval. Using the July data as the starting point allowed Dynamac to immediately begin working on the sampling methods analysis, including categorization. The December sort was purchased and was received within three days, on December 8, 1999 (the D&B files are dated December 6, 1999). Attachment 1 also lists the fields in the December sort and allows a direct comparison of the fields included in both the July and December 1999 sorts.

The July sort has 1,764 line items, while the December sort has 1,741 line items. Not all entries in the December sort are found in the July sort and vice-versa. A total of 144 facilities listed in the July sort are not found in the December sort, and 121 facilities listed in the December sort are not listed in the July sort. This analysis was performed by comparing facility names only and did not take into account duplicates. These differences reflect updates to the master D&B database between July and December 1999. Dynamac assumed that the 144 facilities in the July sort were either no longer in business or were operating under another name (mergers, buyouts, etc.). The 121 December facilities were assumed to represent new businesses or old facilities operating under a new name. Only facilities listed in both database sorts, and which met all requirements for categorization presented later in this report, were used for the statistical sampling. For purposes of the categorization process discussed later in the report, a facility with "no sales data" is one that was not found in the December sort. Only those facilities listed in the December sort have sales volume information.

Both versions, July and December 1999, of the D&B sorts contain duplicates, that is, distinct entries with the same facility name and address. In some cases, the eight digit SIC-based identifier used in the July sort is different in the December sort for the same facility (identified by the same name and address). Both sorts have facilities listed with incomplete SIC/D&B identifier codes (e.g., four or six digits out of a possible eight). Both sorts have fields with missing or incomplete information. These issues are further discussed in the following section of this report.

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3. METHODOLOGY USED FOR SAMPLING SCHEME

3.1 Proposed Sampling Scheme

The purpose of the survey was to gather information about nonhazardous and hazardous waste generation and management practices in the U.S. paint and coatings manufacturing industry. Dynamac's statistical sampling approach had to identify, with a 90% or greater probability, a one in twenty (1 in 20) waste management practice, that is, a waste management practice used by 5% or less of the population.

Dynamac used the July 1999 sort, which does not contain sales information, as the basis for the survey. Only facilities listed in the July sort could be used. Facilities from the July sort and not found in the December 1999 sort were not used because they lacked sales volume information in the December 1999 sort and thus could not be categorized. Also, only SIC-based D&B identifiers from the July database were used. This allowed Dynamac to begin identifying and testing potentially usable sampling methods before the December database was received.

EPA had suggested that Dynamac start with a sampling of 250 facilities for its statistical evaluation. The first calculation assumed a population of 1,764 and no categorization. This initial statistical analysis showed that 250 randomly chosen samples from a population of 1,764 would easily meet the probability criteria. If 250 samples (or questionnaires) were sent and the statistics were based on the entire data set of 1,764 facilities, there was less than a one percent chance (specifically, 0.45%) of missing a waste management practice conducted by 1 in 50 facilities, a ratio significantly less than the target ratio of 1 in 20.

Both EPA and Dynamac were concerned about the effects that paint and coating types and sales volume might have on waste management practices. (Paint and coating types include waterborne, solvent based, aerosol, and reactive). EPA expected to find different waste management practices at paint manufacturing facilities that produced waterborne paints when compared with practices used at facilities manufacturing solvent based paints. Similarly, small paint manufacturers might not use the same waste management practices as large facilities due to cost of equipment, waste volumes generated, etc. To alleviate these concerns, EPA directed Dynamac to categorize the paint manufacturing facilities by paint type (2 categories - architectural and Original Equipment Manufacturer (OEM)), sales volume (3 categories - small, medium and large) and whether or not the facility was a TRI generator with chemical releases to the land-based units of concern in 1997 (2 categories).

The D&B 2851 01 xx category contained architectural paint manufacturers and coatings manufacturers, as well as manufacturers of paints such as traffic marking and marine paints classified under Special Purpose by the Census Bureau. The "01" category was named architectural. The D&B 2851 02 xx category contained a large number of enamel, lacquer, varnish, epoxy, urethane, vinyl, and related paint and coating manufacturers. The "02" category was named OEM.

Dynamac recommended and EPA agreed to use the same classification of sales volumes used by the Census Bureau. This definition was defined as:

- Small, less than $5 million;
- Medium, between $5 and $20 million; and
- Large, greater than $20 million.

TRI generators are known to use waste management practices of interest to EPA. Including them in the categorization process increased the likelihood that facilities using the management practices of interest would be sampled. EPA provided Dynamac with the list of 75 TRI generators that were listed under SIC 2851 in the TRI database with chemical releases in 1997 to the land-based waste management units of concern to this listing determination. Any such TRI-listed facility that also was in the D&B July 1999 sort (and met all other categorization requirements) was identified and given the TRI designation. The categorization process generated 12 categories, as shown in **Table 2.**

Table 2: Categories of Paint Manufacturers

Category	Description	Category	Description
Small, 01, TRI	small sales volume, architectural type paints and TRI generator	Small, 02, TRI	small sales volume, OEM type paints and TRI generator
Medium, 01, TRI	medium sales volume, architectural type paints and TRI generator	Medium, 02, TRI	medium sales volume, OEM type paints and TRI generator
Large, 01, TRI	large sales volume, architectural type paints and TRI generator	Large, 02, TRI	large sales volume, OEM type paints and TRI generator
Small, 01, non-TRI	small sales volume, architectural type paints and non-TRI generator	Small, 02, non-TRI	small sales volume, OEM type paints and non-TRI generator
Medium, 01, non-TRI	medium sales volume, architectural type paints and non-TRI generator	Medium, 02, non-TRI	medium sales volume, OEM type paints and non-TRI generator
Large, 01, non-TRI	large sales volume, architectural type paints and non-TRI generator	Large, 02, non-TRI	large sales volume, OEM type paints and non-TRI generator

Using this categorization methodology, each category would have to meet the statistical requirements of identifying with a 90% probability or greater a waste management practice used by one in twenty facilities. In addition, this sampling scheme satisfied EPA's request that the survey should not be biased geographically. This categorization methodology was chosen for the statistical survey.

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3.2 Categorization Process

The first step in categorizing paint manufacturing facilities required the removal of those facilities from the July sort that could not be categorized and that were not of interest. Facilities that could not be categorized included those identified with only the first four digits, since this incomplete identification did not allow distinguishing between manufacturers of paint and manufacturers of related products. This group (identified by SIC 2851 00 00) consisted of 705 facilities. The removal of this group of facilities reduced the population to 1,059.

The group of facilities that were not of interest consisted of those identified as non-paint manufacturers. These included the following as identified by the D&B nomenclature:

- 31 manufacturers of miscellaneous non-paint products, such as putty, wood fillers and sealers listed under SIC 2851 03 xx;
- 46 manufacturers of paint removers and cleaners listed under SIC 2851 04 xx;
- 31 manufacturers of non-paint products listed under SIC 2851 01 xx and SIC 2851 02 xx. These included manufacturers of:
  - Colors in oil, except artists, under SIC 2851 01 01;
  - Paint driers, under SIC 2851 01 04;
  - Intaglio ink vehicle, under SIC 2851 02 04;
  - Japans, baking or drying, under SIC 28511 02 05; and
  - Lithographic varnishes, under SIC 2851 02 07.

The removal of this group of 108 facilities not of interest further reduced the population to 951 facilities. After the completion of this step, the D&B December 1999 sort became available. As mentioned earlier in this report, relevant December 1999 new data, such as sales volume and miscellaneous facility information (street addresses to replace PO boxes, phone numbers, and contact names, if missing from the July sort), were then imported into the version of the July 1999 sort that had undergone the categorization changes described so far (a comparison of the fields in the July and December databases is included in Attachment 1). No new facilities from the December sort were added to the sampling population. If a facility, included in the 951 was not found in the December sort, it was classified as "without sales data" and dropped from the population.

Table 3 identifies the subdivisions of SIC 2851 01 xx and SIC 2851 02 xx. It is within these code numbers that the facilities of interest were identified and categorized. Bolded code numbers were used to identify facilities of interest. In general, the SIC 2851 01 xx facilities are predominantly architectural paint manufacturers as well as manufacturers of paints such as traffic marking and marine paints classified under Special Purpose by the Census Bureau, and the SIC 2851 02 xx facilities are predominantly OEM.

The second step in categorizing paint manufacturing facilities consisted of the removal of duplicate facilities and of facilities that were not listed in the December database. Dynamac identified 67 facilities in this category. The Dynamac statistician who performed the original

work indicated that the 67 facilities consisted of 40 duplicate facilities and 27 facilities that were not included in the December database; however, he did not provide a list of those facilities. A later attempt to re-produce the two lists, 27 and 40, arrived at the same total of 67 facilities but did not reproduce the two groups of 40 and 27 facilities. The removal of the 67 facilities resulted in reducing the sampling population to 884.

Table 3: Dun & Bradstreet Codes Used for Categorization

Identification Number	Description	Identification Number	Description
2851 00 00	Paint, varnishes, lacquers, enamels and allied products		
2851 01 00	**Paint and paint additives**	**2851 02 00**	**Lacquers, varnishes, enamels and other coatings**
2851 01 01	Colors in oil, except artists	**2851 02 01**	**Coating, air curing**
2851 01 02	**Lead-in-oil paints**	**2851 02 02**	**Enamels, nec**
2851 01 03	**Marine paints**	**2851 02 03**	**Epoxy coatings**
2851 01 04	Paint driers	2851 02 04	Intaglio ink vehicle
2851 01 05	**Paints, asphalt or bituminous**	2851 02 05	Japans, baking or drying
2851 01 06	**Paints, waterproof**	**2851 02 06**	**Lacquers: bases, dopes, thinner**
2851 01 07	**Paints: oil or alkyd vehicle or water thinned**	2851 02 07	Lithographic varnishes
2851 01 08	**Plastic base paints and varnishes**	**2851 02 08**	**Polyurethane coatings**
2851 01 09	**Undercoatings, paint**	**2851 02 09**	**Shellac (protective coating)**
		2851 02 10	**Stains: varnish, oil or wax**
		2851 02 11	**Varnishes, nec**
		2851 02 12	**Vinyl coatings, strippable**
		2851 02 13	**Wood stains**

Upon additional review of the data, after the completion of the categorization and sampling efforts, Dynamac determined that seven facilities in the group of 67 that were removed in step two should not have been removed because they were, in fact, included in the December 1999 sort. These seven facilities are listed in **Table 4**. In all cases, the error could be traced to the facility address listed in each sort. In all of the seven cases, the facility addresses could not be matched. Upon closer analysis of the data in the December sort, which included a mailing

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address field not included in the July sort as well as the facility address field, the mailing address in the December sort matched the facility address in the July sort (for these seven facilities). Dynamac's statistician does not believe this error significantly affected the statistical accuracy of the survey as oversampling was conducted (explained in Section 3.3) to meet the number of questionnaires the Agency intended to send out.

Table 4: Facilities Removed from Population Erroneously

Company	Address	City	State	SIC
Akzo Nobel Coatings Inc.	P.O. Box 669	Bloomfield	MI	28510107
Akzo Nobel Coatings Inc.	P.O. Box 7062	Troy	MI	28510213
Akzo Nobel Coatings Inc.	PO Box 4240	Troy	MI	28510213
C A Reeve Paint Co.	PO Box 1165	Syracuse	NY	28510107
Contract Coating Corp	706 E Main St.	Stockton	CA	28510100
Sagamore Industry Finish Corp	PO Box 165	Amesbury	MA	28510107
Williams-Hayward Protective	7425 W 59th St	Summit Argo	IL	28510100

Some of the facilities in the December sort are listed with $0 sales figures. In general, these $0 facilities are one of several manufacturing plants owned by the same corporate entity. In many cases, the sales data is rolled up under the corporate address. In others, the sales data is listed as $0 under the corporate address. In order to ensure as many facilities as possible be included in the statistical survey, Dynamac recommended and EPA approved that a $0 sales facility would be included in the small category.

The number of facilities used in the initial categorization process was 621 and not 884. For unknown reasons, the initial categorization process eliminated all facilities in States after Ohio, in the alphabet. Due to the tight schedule, this issue was not identified until after the first round of sampling was conducted. Although this particularity was noticed earlier, the rationale was that the occurrence was due to the random sampling procedure performed for each category. This rationale was later found to be faulty and the recovery is fully explained in Section 3.4.

3.3 Number of Survey Samples Required to Meet the Objective

The random sampling and facility selection performed by Dynamac for the first round of questionnaires was based on a total population of 621. Dynamac's statistical analysis determined that, if a population of 621 facilities were categorized, a total of 193 questionnaires would be required to ensure a 90% probability of identifying a 1 in 20 event in each category. EPA decided that the number of questionnaires be increased to a total of 250 in order to allow for non-returned questionnaires and for non-paint manufacturers that might have been included in the population. An example of a possible non-paint manufacturer included in the sampling

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population is the case of the head office of a paint manufacturer that does not produce paint at that site.

A sampling method based on random selection and unequal sampling was judged to be best for this application. The 621 facilities used for the first sampling round were sorted into the twelve categories based on sales volume, type of paint and TRI status (the twelve categories are presented in Table 2). Each category was then randomly sorted, and the number of facilities from each category that was required in order to meet the probability criteria was identified. Over sampling was required to attain the 250 questionnaire target. Over sampling was performed on an unequal basis (unequal sampling), since small populations require a higher rate of sampling to assure the 90% probability of identifying a 1 in 20 waste management practice. An example of such a small population is category Large, 01, TRI, which has two entries. This category had to be sampled at 100%, while category Medium, 01, non-TRI, which has 34 entries, was sampled at 82% to meet the statistical requirements. **Table 5** provides information on the number of facilities in each category, the samples required from each, and the probabilities associated with the sampling meeting the statistical requirements of the survey.

The probability of identifying a 1 in 20 event was 95% or better for all categories (assuming all questionnaires were returned). The 250 randomly identified paint facilities received a questionnaire (i.e., were sampled). Three exceptions were made by EPA as a result of information obtained in a notification letter sent out a few weeks before the first questionnaire mailing. The three facilities identified themselves as non-paint manufacturing facilities. They were replaced with the spares previously identified in the respective categories through the random selection process. The first spare in each category was the first facility from the list in that category that was not chosen. For example, if a category had a population of 50 and the statistical requirements were met with 30 samples, the 31st randomly listed facility became the first spare.

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Table 5: Best Coverage Using 250 Questionnaires Distributed Unequally Among the 12 Categories

Category	Number in Category	Number of Samples	Percent Coverage	Probability of Missing 1:20
Large, 01,TRI	2	2	100.00	NA
Medium, 01, TRI	0	0	0.00	NA
Small, 01,TRI	4	4	100.00	NA
Large,01, non-TRI	25	24	96.00	0.04
Medium, 01, non- TRI	49	41	83.67	0.02
Small, 01, non-TRI	255	63	24.71	0.02
Large, 02, TRI	0	0	0.00	NA
Medium, 02, TRI	0	0	0.00	NA
Small, 02, TRI	6	6	100.00	NA
Large, 02, non-TRI	21	20	95.24	0.05
Medium, 02, non-TRI	34	28	82.35	0.03
Small, 02, non-TRI	225	62	27.56	0.03

3.4 Correction for Omission of Certain States

It is important to realize that the States that follow Ohio alphabetically were not removed by the categorization process itself, but rather by an unknown error during the categorization process. Although it is impossible to say what actually caused the error, the error was confirmed as being based on the alphabetical listing of States. The error resulted in an exclusion of 263 facilities from the population (see **Table 6**).

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Table 6: Increase in Number of Facilities by Category When All States Included

Category	Number of Facilities in First Selection (Through Ohio)	Number of Facilities in New Selection (After Ohio)	Total Facilities in All States
Large, TRI, 01	2	0	2
Medium, TRI, 01	0	0	0
Small, TRI, 01	4	2	6
Large, non-TRI, 01	25	9	34
Medium, non-TRI, 01	49	13	62
Small, non-TRI, 01	255	124	379
Large, TRI, 02	0	0	0
Medium, TRI, 02	0	0	0
Small, TRI, 02	6	1	7
Large, non-TRI, 02	21	2	23
Medium, non-TRI, 02	34	13	47
Small, non-TRI, 02	225	99	324
Total Facilities	**621**	**263**	**884**

From a statistical point of view, the first survey met all selection criteria for the facilities in the States included in the process. The fault only eliminated the statistical possibility that a facility with a waste management practice that may be unique to the missing States would be randomly selected. The statistical methods used in the initial sampling plan are valid, and the exclusion of States does not greatly affect the probability of missing a relatively rare management practice (i.e., meeting the 90% probability of finding a waste management practice used by 1 in 20).

Probabilities are slightly affected because of the increase in sampled population derived from particular categories (see **Table 7**). In evaluating the responses to this event, two concerns needed to be addressed: the exclusion of 16 States after Ohio in the alphabet from the selection process and the high number of non-paint manufacturers identified in the first sampling. A total of 105 respondents to the first round of questionnaires indicated they were not manufacturing facilities of concern. A second round of sampling was determined to be the proper course of action.

To determine the minimum number of questionnaires to be sent in the second round, Dynamac again filtered the D&B database, this time including paint manufacturing facilities from all States. The total number of potential respondents became 621 (from first selection) plus 263

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(from new States) for a total of 884 facilities across all States (Table 6). Dynamac categorized the new facilities into the original 12 categories. In some cases, there are no new facilities in a particular category (Table 6). The majority of the new facilities are small, non-TRI, in both the Architectural (01) and OEM categories (02). The minimum number of questionnaires required to meet the statistical requirements increased from 193 to 210 (**Table 8**).

Dynamac recalculated the statistics based on the new data for each individual category (Table 8). The minimum number of samples or questionnaires required to meet the objectives of having a 90% or greater probability of sending a questionnaire to a facility with a relatively rare waste management practice (i.e., 1 in 20) in each category was, for the most part, unaffected by the addition of 263 facilities. Assuming that all 250 questionnaires that were sent out are returned, there is only a total of seven additional questionnaires needed to maintain all probabilities at or above the target of 90%. The additional questionnaires were required for the following categories: Small, 01, TRI (+2); Small, 02, TRI (+1); Medium, 02, non-TRI (+4) (**Table 9**). It should also be noted that the categories that required additional samples were made up of relatively few individuals and do not represent the bulk of the data. However, although the probabilities are maintained, the issue of geographical equality was a concern that needed to be addressed.

To determine the actual number of questionnaires to be sent in the second round, Dynamac chose 250 samples from the 12 categories totaling 884 facilities. The randomization process within each category was the same as that used to generate the original mailing list except that this time no facilities (or States) were excluded from the process. The number of randomly chosen facilities in States that were alphabetically past the State of Ohio was summed for each respective category. A total of 49 facilities in States after Ohio were identified by the random process. The number of facilities, by category, is shown in **Table 10**.

Dynamac recommended and EPA agreed that an additional 49 questionnaires would be sent out from those States previously not sampled. Although 49 additional questionnaires are more than needed to meet the goal of a 90% or better probability of including a waste management practice conducted by 5 percent of the total number of facilities (i.e., 1 in 20), that number allowed the EPA to assure all parties that all States are fairly represented. The additional questionnaires also accommodated unreturned and problematic questionnaires and assured that the minimum number of usable responses were received to maintain statistical integrity.

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Table 7: Probabilities Using Number of Questionnaires Already Sent and Revised Category Totals

Category	Revised Number	Number of Questionnaires Sent	Probability of Missing 1:20
Large, 01, TRI	2	2	NA
Medium 01, TRI	0	0	NA
Small, 01, TRI*	6	4	NA
Large 01, non-TRI	34	24	0.0802
Medium, 01, non-TRI	62	41	0.0352
Small, 01, non-TRI	379	63	0.0288
Large, 02, TRI	0	0	NA
Medium, 02, TRI	0	0	NA
Small, 02, TRI*	7	6	NA
Large, 02, non-TRI	23	20	0.0870
Medium, 02, non-TRI*	47	28	0.1581
Small, 02, non-TRI	324	62	0.0305
Total	**884**	**250**	

*Represents categories that require additional questionnaires to meet statistical criteria.

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Table 8: Probabilities with All Facilities Included

Category	Original Number	Revised Number	Number of Questionnaires from Revised Sampling Method*	Minimum Number of Questionnaires Needed to Meet Criteria	Probability of Missing 1:20**
Large, 01, TRI	2	2	2	2	NA
Medium 01, TRI	0	0	0	0	NA
Small, 01, TRI	4	6	6	6	NA
Large 01, non-TRI	25	34	28	23	0.0980
Medium, 01, non-TRI	49	62	48	33	0.0966
Small, 01, non-TRI	255	379	77	43	0.0956
Large, 02, TRI	0	0	0	0	NA
Medium, 02, TRI	0	0	0	0	NA
Small, 02, TRI	6	7	7	7	NA
Large, 02, non-TRI	21	23	22	21	0.0870
Medium, 02, non-TRI	34	47	34	32	0.0971
Small, 02, non-TRI	225	324	75	43	0.0966
Total			**299**	**210**	

* Represents oversampling due to additional questionnaires to ensure all States are represented (+49), and additional questionnaires to ensure minimum number of questionnaires are received to meet statistical requirements (250-210=+40).

**Probabilities based on revised number of questionnaires (299).

Table 9: New Probabilities Based on Increased Sampling (affected categories only)

Category	Revised Number In Category	Number of Questionnaires to Meet Criteria	Number of Additional Questionnaires	Probability of Missing 1:20
Small, 01, TRI	6	6	2	NA
Small, 02, TRI	7	7	1	NA
Medium, 02, non-TRI	47	32	4	0.0971

Table 10: Number of Additional Samples Required by Category

Category	Questionnaires Needed
Large, 01, TRI	0
Medium, 01, TRI	0
Small, 01, TRI	2
Large, 01, non-TRI	4
Medium, 01, non-TRI	7
Small, 01, non-TRI	14
Large, 02, TRI	0
Medium, 02, TRI	0
Small, 02, TRI	1
Large, 02, non-TRI	2
Medium, 02, non-TRI	6
Small, 02, non-TRI	13
Total	**49**

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4. FLOWCHART

Dynamac has prepared a flowchart to show the step by step progression of the process to derive the sampling population of 884 facilities. The flowchart is included in **Attachment 2**.

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